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Interoperability in Net Centric Operations (NCO)

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Introduction – Three NCO Interoperability Challenges

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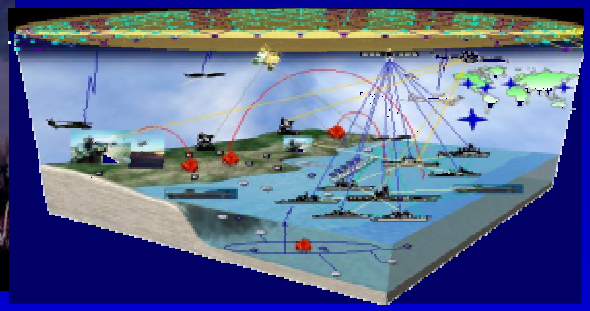
- **Systems of systems development**
  - Increasingly complex Joint/Coalition/Civil battlespace
  - Expanding number of “netted” systems on an unprecedented scale
  - Multiple architectures
  - Scaling
- **Capabilities-based development**
  - Systems engineering and requirements flow-down
  - Distributed development
  - Modeling & simulation
  - Testing & fielding
- **Acquisition challenges**
  - Co-evolution & convergence
  - Current system assimilation
  - Asynchronous programmatics
  - Budget pressure



Systems-of-Systems Development

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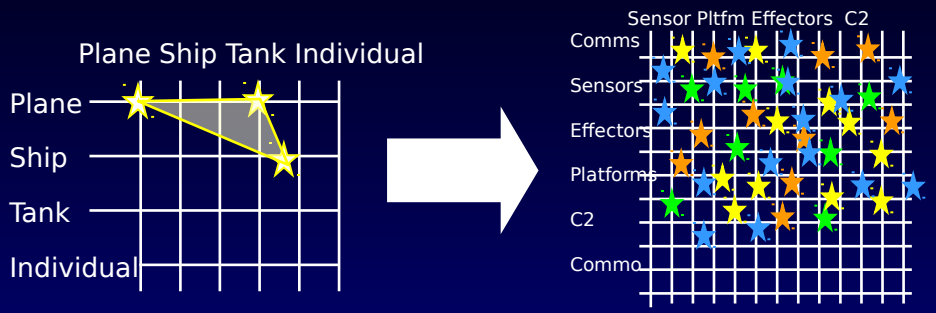
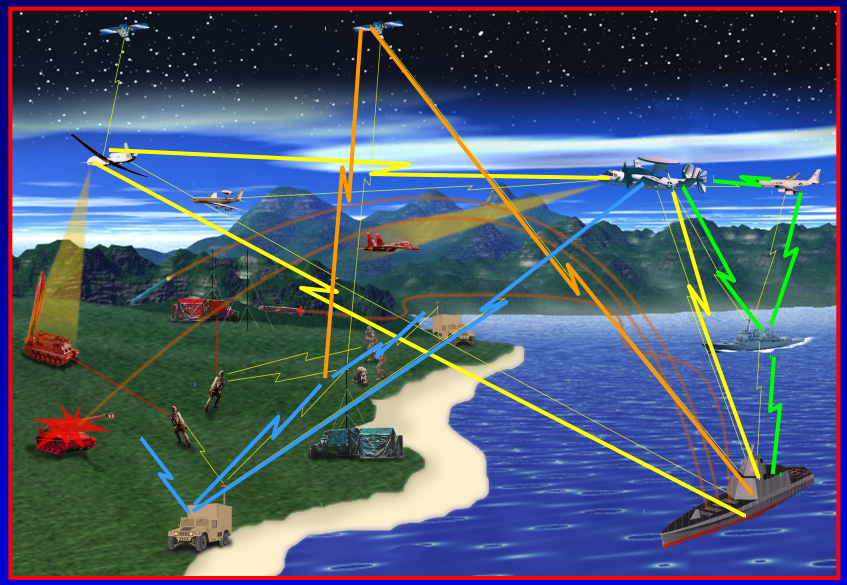
- **Complexity of NCO operations**
  - **Joint/Coalition/Civil collaboration**
  - **Exponential growth in sensors and systems**
  - **Effects-based capabilities**
  - **Complex resource allocation**



- **Compliance with joint capabilities process**
  - **Decompose capabilities into system requirements and design**
  - **Account for unexpected behavior**
  - **Testing complexity**

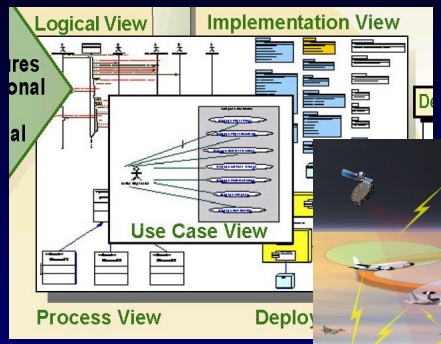
- **Architecture**
  - **Multiple architecture frameworks**
  - **Assimilation of current systems**
  - **Data and information standardization and security**
  - **Incompatible systems tools**



NCO end-state is interoperability dependent

Capabilities-Based Development

- Tools for specifying SoS NCO architectures
- M&S for improved understanding and acquisition (JVB/JSB)
- Defining and measuring performance
- Isolate problems in the earliest spirals
- Develop test environments that reflect real world complexity (JDEP)
- Experimentation and accepted CONOPS refinement (e.g.Joint National Training Center [JNTC])
- End-to-end training and sustainment



Performance insight, early problem discovery, rapid feedback

Acquisition Challenges

- **Co-evolution and convergence**
  - **Programmatic modularity and loose coupling**
  - **Configuration management**
  - **Measuring performance is the issue (capabilities-based)**
- **Backward/forward compatibility**
  - **Compliance to NCO (enhance or retire)**
  - **Longer current system life-cycles**
- **Test and evaluation in NCO environment**
  - **Deconfliction of industry and Government assets**
  - **Experimentation, lessons learned, M&S**
  - **Anticipate unpredictability**
- **Business model**
- **Budget pressures**

eliver interoperable warfighting capabilities in an uncertain environmen

Summary

- **Timely, synchronized development and acquisition - supporting capabilities-based interoperable solutions**
- **Architecture standards, CONOPS experimentation, distributed testing/M&S, spiral feedback, configuration management - keys to managing risk and anticipating uncertainty**
- **Flexible adaptation and innovation (operational and development) of fielded capabilities - accommodating budget realities and technological evolution**